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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/592,971	09/15/2006	Heon Jin Choi	930086-2038	4062

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Ronald R. Santucci  
Frommer Lawrence & Haug LLP  
745 Fifth Avenue  
New York, NY 10151

EXAMINER
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CHANG, HANWAY

ART UNIT	PAPER NUMBER
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2881

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/592,971	<b>Applicant(s)</b> CHOI ET AL.	
	<b>Examiner</b> Hanway Chang	<b>Art Unit</b> 2881	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 09/15/2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 September 2006 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☒ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>09/15/2006</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## **DETAILED ACTION**

### ***Priority***

Acknowledgment is made of applicant's claim for foreign priority based on an application filed in the Republic of Korea on 03/17/2004. It is noted, however, that applicant has not filed a certified copy of the 10-2004-0017901 application as required by 35 U.S.C. 119(b).

### ***Claim Objections***

Claim 1 is objected to because of the following informalities:

The fourth line of the claim recites "the selected area" and is suggested to be rewritten to read "~~the~~ a selected area".

Furthermore, the eight line of the claim recites "said ionized material to be analyzed" and is suggested to be rewritten to read "said ~~ionized material~~ specimen containing a substance to be analyzed".

Appropriate correction is required.

### ***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 6 and 9 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 6 recites the limitation "said material to be analyzed" in the first line of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 9 recites the limitation "said specimen containing" in the eighth line of the claim. There is insufficient antecedent basis for this limitation in the claim.

Claim 9 further recites the limitation "said nanowire spot" in the ninth line of the claim. There is insufficient antecedent basis for this limitation in the claim.

### ***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 3, 8-9, 12-13, 18-19, 21, 24, and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Niu et al. (US PGPub 2008/0073505, hereinafter Niu).

Regarding claims 1, Niu discloses forming a nanowire spot by growing a plurality of minute nanowires in the selected area of a conductive material capable of applying voltage (see paragraph [0051]); placing the specimen containing a substance to be analyzed in the nanowire spot and crystallizing by drying (see paragraph [0059]); and performing mass spectrometric analysis of the ionized material to be analyzed in a state

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where voltage is applied in the board, while simultaneously irradiating laser onto the nanowire spot, wherein the specimen is adsorbed to and crystallized in the nanowire under reduced pressure, to transfer energy to the specimen through the nanowire (see paragraphs [0049-0050]). It should be noted that the nanowires are shown in Fig. 2A as the thin non-silicon film layer (22) having a nano-structured surface (see paragraph [0050]). It should be further noted that each thin non-silicon film layer (22) is on a support substrate (10) as seen in Fig. 1 as being a plurality of wire-like structures. It should be further noted that mass spectrometry is inherently in a vacuum state (reduced pressure) unless stated otherwise.

Regarding claims 3, 12, and 21, Niu discloses the nanowire to be grown is alumina ( $\text{Al}_2\text{O}_3$ ) (see paragraph [0051]).

Regarding claims 8, 18, and 27, the value of the mass over electric charge ( $m/z$ ) of ions is inherently measured while performing mass spectrometric analysis of the ionized material.

Regarding claims 9 and 19, Fig. 1 of Niu discloses manufacturing nanowire suspension containing a plurality of minute nanowires (22) (see paragraph [0051]); forming a nanowire islet after drying the nanowire suspension coated on the selected area of a conductive material or a semiconductor board capable (10) of applying voltage (see paragraph [0049]); placing the specimen (12) containing a substance to be analyzed in the nanowire spot and crystallizing by drying (see paragraph [0059]); and performing mass spectrometric analysis of the ionized material to be analyzed in a state where voltage is applied in the board, while simultaneously irradiating laser onto the

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nanowire spot, wherein the specimen is adsorbed to and crystallized in the nanowire under reduced pressure, to transfer energy to the specimen through the nanowire (see paragraph [0049-0050]). It should be noted that the nanowires (22) are used to hold an active layer (24) in place, therefore the nanowire (22) are nanowire suspensions. It should be further noted that mass spectrometry is inherently in a vacuum state (reduced pressure) unless stated otherwise.

Regarding claims 13 and 24, Niu discloses the nanowire suspension is formed by spraying on the selected area of the semiconductor board (see paragraph [0051]).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 2, 4-7, 10-11, 14-17, 20, 22-23, and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Niu.

Regarding claims 2, 11, and 20, Niu discloses forming the nanowire except that the nanowire has a diameter of 500 nm or less and an aspect ratio of 10 or higher. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Niu by forming the nanowires with certain dimensions, since it has been held that discovering an optimum value of a result

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effective variable involves only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980).

Regarding claims 4, 14, and 25, Niu does not explicitly disclose that the nanowire spot is formed so that it is equal to or smaller than the area for laser irradiation. However, it would have been obvious at the time of invention to a person of ordinary skill in the art to modify Niu by forming the nanowire spot such that it is equal to or smaller than the area for laser irradiation for the purpose of controlling the amount of analytic molecules.

Regarding claims 5, 15, and 22, Niu does not explicitly disclose the specimen comprises a salt and the material to be analyzed, wherein the concentration of the salt is greater than 10 mM. However, it would have been obvious at the time of invention to a person of ordinary skill in the art to choose a specimen comprising a salt with a concentration of greater than 10 mM, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claims 6, 16, and 23, Niu does not explicitly disclose the material to be analyzed in the specimen contains less than 1 femto mole. However, it would have been obvious at the time of invention to a person of ordinary skill in the art to adjust the concentration of the specimen such that the material to be analyzed in the specimen contains less than 1 femto mole, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

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Regarding claims 7, 17, and 26, Niu does not explicitly disclose the energy of the laser. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Niu by adjusting the energy of the laser such that the energy is greater than the band gap of the nanowires grown in the semiconductor board according to the kind of nanowires to be selected., since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hanway Chang whose telephone number is (571)270-5766. The examiner can normally be reached on Monday to Thursday 7:30 AM till 5 PM EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on (571)272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.



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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jack I. Berman/  
Primary Examiner, Art Unit 2881

Hanway Chang  
March 02, 2009  
/H. C./  
Examiner, Art Unit 2881